No. 1012

Hybrid Method of Micro-Bubble and Photocatalyst to Purify Polluted Seawater

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Summary

Ability to produce active oxygen species such as hydroxyl radical (OH•), super-oxide radical (O_2^-) and hydrogen peroxide (H_2O_2) on 1 μm of micro-bubble (mic-B) generated by pressurized dissolution pump have been studied by luminol (L) chemiluminescent and coumarin (Cm) fluorescent probe methods to develop polluted sea water purification system. No these active oxygen species could be observed from these methods in the pure water and an artificial sea water. Umberiferon, which is 7-hydroxyl-coumarin (7-OH-Cm) produced from reaction of Cm with OH•, was observed from the mic-B reaction in condition of pH 2 to 4. The several kinds of metal ion was analyzed by ICP on the mic-B after 180 min reaction at pH 2 to 4, indicating that acidic solution dissolved metal ion from the micro-bubble generator and the metal ion oxidized Cm to 7-OH-Cm. No methylene blue (MB) decomposition was observed by mic-B reaction, indicating that the thermal decomposition by calorific value generated by collapse of mic-B was few in pure water and artificial sea water. The effect of mic-B to scrub MB molecules adsorbed at the surface of TiO_2 and SiO_2, which were model metal oxide of sand of sea, was also studied and the lack of ability to scrub on of mic-B was observed. On the basis of these results, we conclude that the 1 μm of mic-B generated by pressurized dissolution pump have a lack of ability to purify the polluted sea water. These results grounded by scientific verification give us reliable information to utilize the mic-B generated by pressurized dissolution pump and exploring the utilization of hybrid system of mic-B with photocatalyst for decomposing pollution can pave the way for designing novel polluted sea water purification systems.